



Dart Hawkesbury
1270 Aberdeen St
Hawkesbury, ON
K6A 1K7
Canada



D119-796-141TRN
Job Sheet 166879-A



Tel (613) 632-5200

Part No: D119-796-141TRN

Job Qty: 1 ea

Part Name: Crosstube Turning Detail



Part Weight: 0 lbs

Status: Scheduled

Priority: Medium

Job Created: 10/19/17

Job Tracking No:

Due Date: 10/31/17

Created By: Victoria Michaud-Febrille

Type: Stock

Description:

Ship Via:

Bill of Materials

Job Routing

Op No	Operation	Qty	Start Date	Due Date	Standard		Workcenter/Supplier	
					Setup hrs	Run Hrs	Workcenter / Supplier	Lead Time
90	Start up Operation	1 Ea		10/30/17	0.00	0.00	Start Up Crosstubes	
100	Mori Seiki	1 pcs		10/30/17	1.99	1.52	Mori Seiki TL-40	PMP
110	QC	1 pcs		10/30/17	0.00	0.00	QC21	PMP
120	Mori Seiki	1 pcs		10/30/17	0.00	1.52	Mori Seiki TL-40	PMP
130	QC	1 pcs		10/30/17	0.00	0.00	QC21	PMP
140	QC	1 pcs		10/30/17	0.00	0.00	QC8	
145	Crosstubes	1 pcs		10/30/17	0.00	0.33	Crosstube	
150	HandFXtube	1 pcs		10/31/17	0.00	0.40	Crosstube	
160	QC	1 pcs		10/31/17	0.00	0.00	QC7	
170	Packaging	1 pcs		10/31/17	0.00	0.00	Packaging3	
180	QC21-FG	1 Ea		10/31/17	0.00	0.00	QC21	

Part Op 100 - 1-Fill tube with sand & install plugs on both ends as per Folio FB316 2-Turn first side as per Folio FB316 3-Blend
Descriptions: transition lines only, **do not sand whole tube**: FOLIO REV: AA DWG REV: H *Use mill bastard
file, brush file repeatedly with file card. *Do not use sandpaper coarser than 320 grit.

120 - 1-Turn second side as per Folio FB316 2-Blend transition lines only, **do not sand whole tube**: 3-Remove sand
and plugs 4- scribe batch # and part # as per dwg

145 - GRIND ONLY TRANSITION LINES SMOOTH LONGITUDE WAY.

150 - 1- handfinish X-TUBE INSIDE AND OUT 2- ALODINE AND ACID ETCH X-TUBE INSIDE AND OUT. USE RED
SCOTCH BRITE

170 - LOCATION : LG014

Job Allocations

Operation	Component Part	Required	Inventory	Allocated	Std Qty
90-Start up Operation	D6024-103	1	42	0	0

B150732

Part Specifications

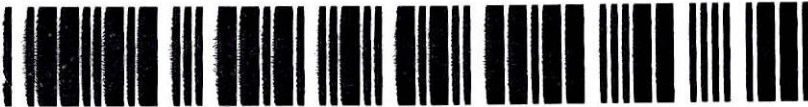
Specifications could not be found.

WORK ORDER NON-CONFORMANCE / UPDATE

DQA: _____ Date: _____
QA Closed: _____ Date: _____

Work Order update only

AGAINST DEPARTMENT/PROCESS

Engineering ☐ Water Jet ☐ By ☐ Supervisor ☐ Inator ☐
DART
AEROSPACE
S014033

Crosstube Turning Detail

Dart Aerospace Ltd.
1270 Aberdeen Street
Hawkesbury, ON K64 1K7
CANADA
TEL.: 1 613 632-5200
Email: sales@dartaero.com
www.dartaerospace.com

PART NO: D119 - 796 - 141TRN
Revision:
Operation: Start up Operation
Change No:

Mfg Date: 11/27/17
Job No: 166879 - A

DISPOSITION
 Rework ☐ Skid-tube ☐
 Scrap ☐ Machinir ☐
 Use-as-is ☐ Thermoformir ☐
 Suspected Unapproved ☐ Large Fa ☐
 QTY Eff ☐

Description Work Order Deviation

Root Cause		Pressure/Forced		Temperature/Cur	
Environment	No Re-verification	Bending	Set-up	Set-up	Set-up
Design	Operator	Centre Not Concentric	BOM/Route	BOM/Route	BOM/Route
Doc/Data	Offset/Setup	Cracks	Broken/Damage/	Broken/Damage/	Broken/Damage/
Equip/Tooling	Supplier	Crimp/Kink/Ripple/Wave	Inspection Incom	Inspection Incom	Inspection Incom
Handling/Pre	Training	Cuffs	Contamination	Contamination	Contamination
Material	Use for Testing	Crushing	Countersink	Countersink	Countersink
Internal Transport	Poor Information	Heat Treat	Cut Too Short	Cut Too Short	Cut Too Short
Tribal Knowledge	Rushing	Wave/Twist in Tube	Instructions Incor	Instructions Incor	Instructions Incor
LOA	Product Improvement	Marks/Chatter	Drill Holes	Drill Holes	Drill Holes
Substation	Process Improvement				
Past Expiry Date	Manufacturing Process				
Misidentified	Past Due				

DART AEROSPACE LTD	Work Order: 166877-A
Description: Crosstube Assembly (AW119 MKII Fwd)	Part Number: D119-796-141TRN
Inspection Dwg: D119-796-141 Rev: H	Page 1 of 2

FIRST ARTICLE INSPECTION CHECKLIST

	Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	6.00	+/-0.030	5.913		✓	VERN 08	
	2.516	+/-0.005	2.520	✓			
	2.333	+0.005/-0.000	2.338	✓			
	2.333	+0.005/-0.000	2.338	✓			
	2.408	+0.005/-0.000	2.413	✓			
	2.502	+0.005/-0.000	2.507	✓			
	2.596	+0.005/-0.000	2.599	✓			
	2.596	+0.005/-0.000	2.600	✓			
SIDE B	6.00	+/-0.030	5.910		✓	VERN 08	
	2.516	+/-0.005	2.520	✓			
	2.333	+0.005/-0.000	2.338	✓			
	2.333	+0.005/-0.000	2.338	✓			
	2.408	+0.005/-0.000	2.413	✓			
	2.502	+0.005/-0.000	2.507	✓			
	2.596	+0.005/-0.000	2.599	✓			
	2.596	+0.005/-0.000	2.601	✓			
	102.26	+/-0.020	102.26	✓		TAPE	

2042 15 08-9

5 4

DQA: _____ Date: _____

**WORK ORDER NON-CONFORMANCE / UPDATE**

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____	DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☒ Suspected Unapproved ☐	AGAINST DEPARTMENT/PROCESS			
Part No. _____		Skid-tube ☐	Cross tube ☒	Water Jet ☐	Engineering ☐
NCR No. _____		Machining ☐	Small Fab ☐	Prod. Eng. Coord. ☐	Quality ☐
		Thermoforming ☐	Finishing ☐	Rec/Store/Packaging ☐	Other ☐
		Large Fab ☐	Composite ☐	Supplier ☐	

Date : <u>17/12/4</u>	Step #: _____	QTY Effective : _____	MRB (QSI042) Approval DAS 12 9-89 <u>17/12/4</u>
Description Work Order Deviation		Disposition	

Well thickness measurement is
over tolerance

Acceptable per attached
calculation

Completed By
DAS 12 9-89 17/12/4

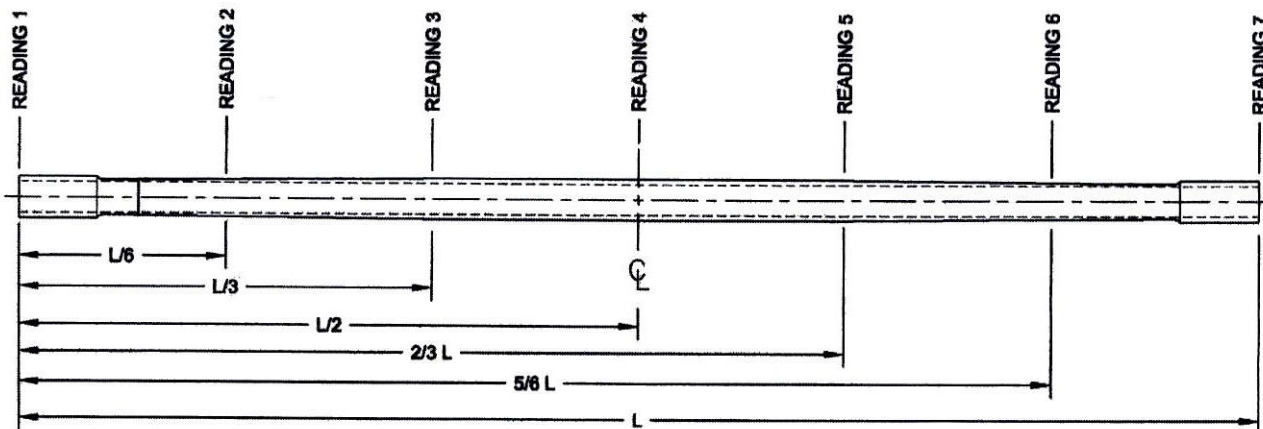
Lead hand / Supervisor
Approval Verification

QC / QA Coordinator
Approval

Root Cause				FAULT CATEGORY			
Environment ☐	No Re-verification ☐	Pressure/Forced ☐	Temperature/Cure ☐	Power Loss/Surge ☐	Positioned Wrong ☐		
Design ☐	Operator ☐	Bending ☐	Set-up ☐	Folio/Program ☐	Outside Dimensions ☐		
Doc/Data ☐	Offset/Setup ☐	Centre Not Concentric ☐	BOM/Route ☐	Grain ☐	Over/Under tolerance ☐		
Equip/Tooling ☐	Supplier ☐	Cracks ☐	Broken/Damage/Defect ☐	Weld ☐	Part Incorrect ☐		
Handling/Pre ☐	Training ☐	Crimp/Kink/Ripple/Wave ☐	Inspection Incomplete/Unqualified ☐	Wrong Stock Pulled ☐	Part Lost/Missing ☐		
Material ☐	Use for Testing ☐	Cuffs ☐	Contamination ☐	Out of Sequence ☐	Part Moved ☐		
Internal Transport ☐	Poor Information ☐	Crushing ☐	Countersink ☐	Off-set ☐	Drawing ☐		
Tribal Knowledge ☐	Rushing ☐	Heat Treat ☐	Cut Too Short ☐	Mislabeled ☐	Finish ☐		
LOA ☐	Product Improvement ☐	Wave/Twist in Tube ☐	Instructions Incomplete/Unclear ☐	Fit/Function ☐	Misread ☐		
Substation ☐	Process Improvement ☐	Marks/Chatter ☐	Drill Holes ☐	Misaligned/off center ☐	Turning Sequence ☐		
Past Expiry Date ☐	Manufacturing Process ☐						
Misidentified ☐	Past Due ☐	OTHER : _____					

DART AEROSPACE LTD	Work Order:	
Description: Crosstube Assembly (AW119 MKII Fwd)	Part Number:	D119-796-141TRN
Inspection Dwg: D119-796-141 Rev: H		Page 2 of 2

WALL THICKNESS MEASUREMENT



Location	WALL THICKNESS MEASUREMENT (IN)				Deviation Δw (max-min)	TOLERANCE
	w1	w2	w3	w4		
READING 1 L= 0"	247	267	263	246	.021	0.030"
READING 2 L= 17.043	174	185	181	173	.012	
READING 3 L= 34.087	271	287	268	244	.043	0.063"
READING 4 L= 51.13	294	295	296	295	.002	
READING 5 L= 68.173	258	285	274	247	.038	0.030"
READING 6 L= 85.217	171	197	175	146	.051	
READING 7 L= 102.26	250	257	259	253	.009	

Dwg Δ

0.268 0.021

0.179 0.035

Avg = 0.172

Calibration Result

Actual Block Thickness: 100-400

Sitescan 250 Measured Thickness: 100-400

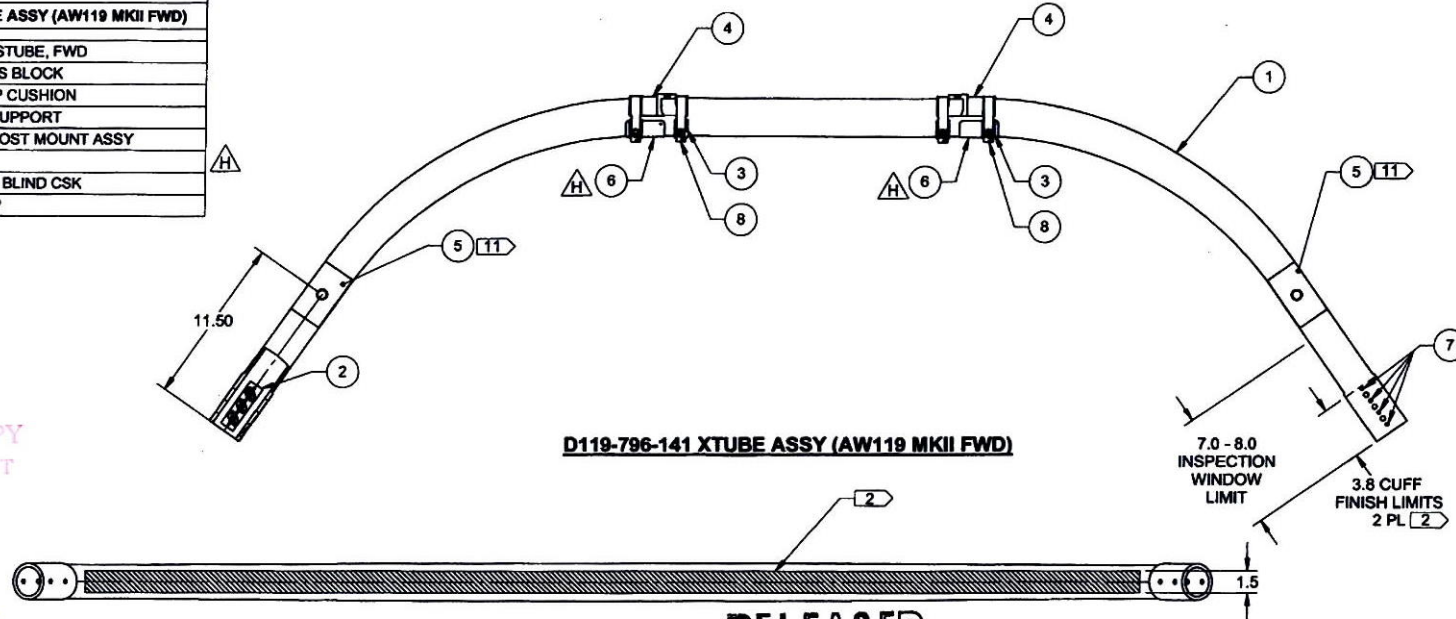
Measured by:	PMP
Date:	2012-10-24

Audited by:	[Signature]
Date:	17-12-05

Preliminary Approval:	
Date:	

Rev	Date	Change	Revised by	Approved
A	15.04.14	New Issue (P/O D119-796-101)	KJ	
B	15.05.14	Tolerances revised per Dwg Rev G	KJ	
C	16.05.27	Dwg Rev updated	KJ	
D	16.09.13	Tolerance revised for Reading 3, 6 & 7	KJ	[Signature]

ITEM	QTY	P/N	DESCRIPTION
	X	D119-796-141	XTUBE ASSY (AW119 MKII FWD)
1	1	D119-796-141BND	CROSSTUBE, FWD
2	4	D2873-043	RADIUS BLOCK
3	4	D5123-3	CLAMP CUSHION
4	2	D5124-1	FWD SUPPORT
5	2	D5152-041	FWD POST MOUNT ASSY
6	2	D5305-1	SHIM
7	16	CR3212-4-08	RIVET, BLIND CSK
8	4	MS21920-24	CLAMP



SHOP COPY
 166879-A
 17/10/19

D119-796-141 XTUBE ASSY (AW119 MKII FWD)

RELEASED
 2015-11-04
 ECU 15-642

NOTES:

- 1) MATERIAL: N/A
- 2) FINISH: APPLY MATTE CLEAR COAT PER QSI 005 4.2
 MASK D5124-1 FWD SUPPORTS, D5305-1 SHIMS AS WELL AS UNDERSIDE OF CROSSTUBE AS SHOWN (B3-1, HATCHED AREA).
 PAINT OUTSIDE PER DART QSI 005 4.2 AFTER APPLYING CLEAR COAT.
 DO NOT APPLY FINISH (PAINT OR CLEAR COAT) TO CUFFS IN LOCATION SHOWN, MASK PRIOR TO FINISHING
- 3) TOLERANCES: PER DART QSI 018 UNLESS OTHERWISE NOTED
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED
- 5) BREAK SHARP EDGES: N/A
- 6) IDENTIFICATION: IDENTIFY USING PART NUMBER "D119-796-141" AND BATCH NUMBER ON INSIDE OF CUFF PER QSI 044 6.4
- 7) WEIGHT: 18.54 lbs
- 8) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE.
 THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM DEFECTS SUCH AS SCRATCHES, NICKS OR DENTS.
 DEFECTS UP TO 0.005 MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 9) PRIOR TO FINISHING, ABRASE MATING SURFACES OF D5124-1 FWD SUPPORTS AND CROSSTUBE WITH SCOTCH BRITE 7447 RED AND REMOVE RESIDUE WITH DUPONT 4105S WASHN/WIPE DEGREASER. APPLY A 0.1 MIN THK LAYER OF PROSEAL 890 ON THE INSIDE CONCAVE SURFACE OF THE D5124-1 FWD SUPPORTS AND INSTALL AT AN 8.4° OFFSET FROM THE CROSSTUBE BENDING PLANE. INSTALL THE MS21920-24 CLAMPS AND D5123-3 CLAMP CUSHIONS WHILE WET.
- 10) TORQUE MS21920 CLAMPS 80 - 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY. THE NUT IS FACING AFT AND HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 890 SEALANT HAS CURED FOR 72 HOURS.
- 11) PRIOR TO FINISHING, ABRASE MATING SURFACES OF CROSSTUBE AND D5152-041 WITH SCOTCH BRITE 7447 RED AND REMOVE RESIDUE WITH DUPONT 4105S WASHN/WIPE DEGREASER. INSTALL D5152-041 WITH LAYER OF PROSEAL 890 ON INSIDE CONCAVE SURFACE, 0.1 MIN THK. LOCATE D5152-041 USING TOOL DT10089.
- 12) PRIOR TO FINISHING, ABRASE MATING SURFACES OF CROSSTUBE AND D5305-1 SHIM WITH SCOTCH BRITE 7447 RED AND REMOVE RESIDUE WITH DUPONT 4105S WASHN/WIPE DEGREASER. INSTALL D5305-1 SHIM WITH LAYER OF PROSEAL 890 ON INSIDE CONCAVE SURFACE, 0.1 MIN THK. USE ADDITIONAL TEMPORARY MS21920-24 CLAMP TO APPLY CLAMPING PRESSURE FOR 72 HOURS.

H	ADD D5305-1 SHIM, D6024-103 WAS D6005-103, D5124-1 NOW INSTALLED ON PRIMER	AP	15.10.13
G	FINISHING ORDER ADJUSTED, CR3212-4-08 WAS -.07, CUFF DIA TOLERANCE INCREASED TO +/- 0.005	AP	15.04.24
F	REMOVED PRIME/ PAINT ON CUFFS, 2.516 WAS 2.500 (C8-5)	AP	15.02.03
E	D5152-041 FWD STEP POST ASSY WAS D5150-1 STEP POST, SCOTCH BRITE 7447 RED WAS 180 GRIT SANDPAPER, ANGLE (B7-2) DIMENSIONED FROM NEW DATUM	DB	15.01.15
D	ADD D5150-1 STEP POST (2X), MOVED INSPECTION WINDOW DETAIL TO SHEET 1, MODIFIED NOTES ON SHT 1 & 3	DB	14.11.25
C	CR3212-4-07 RIVETS WERE CR3212-4-09, 7.5 DEG CUFF ANGLE OFFSET REMOVED (SHT 3), CUFF DIAMETER ON D119-796-141TRN REDUCED TO 2.500, ADDED INSPECTION WINDOW (B7-3), ADDED SHT 4	AP	14.10.23
B	ADDED D2873-043 RADIUS BLOCK, CR3212-4-09 RIVETS, ADDED SKIDTUBE REFERENCE FOR LOCATING CUFF HOLES, RE-ORGANIZED NOTES AND REMOVED REDUNDANT INFORMATION	AP	14.09.02
A	NEW ISSUE	AP	14.08.09
REV.	DESCRIPTION	BY	DATE
DESIGN	AP		
DRAWN	AP		
CHECKED	AJS		
MFG. APPR.	JLM		
APPROVED	WM		
DE APPR.	DS		
DATE	15.10.13		

APPROVED

DART AEROSPACE LTD
 HAWKESBURY, ONTARIO, CANADA

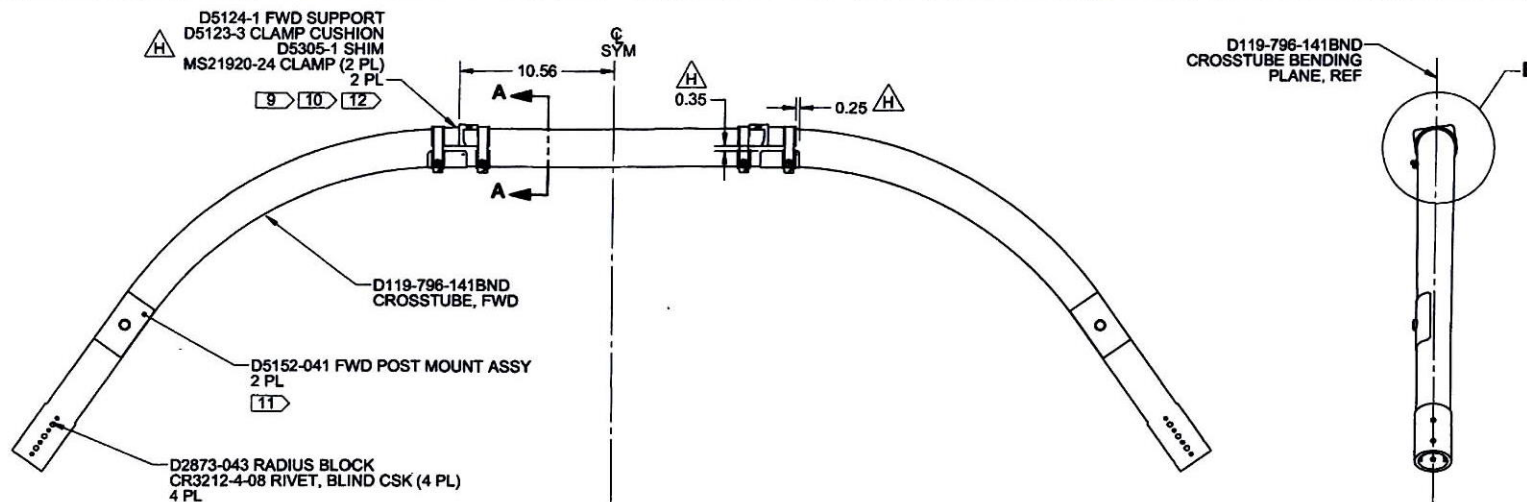
DRAWING NO.
 D119-796-141

REV. H
 SHEET 1 OF 6

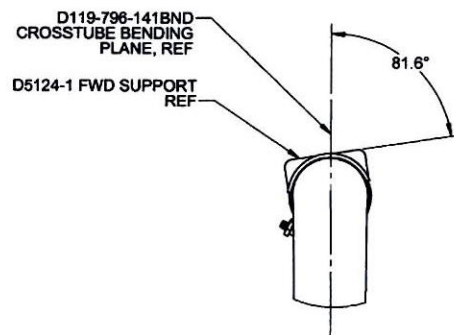
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 XTUBE ASSY (AW119 MKII FWD)

SCALE
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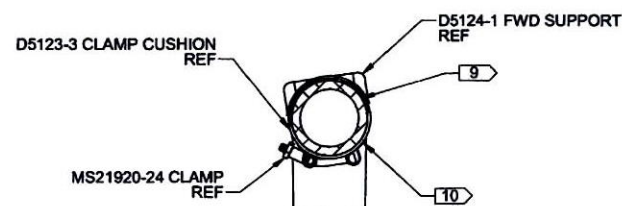
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D119-796-141 XTUBE ASSY (AW119 MKII FWD)



DETAIL B
SCALE 2X

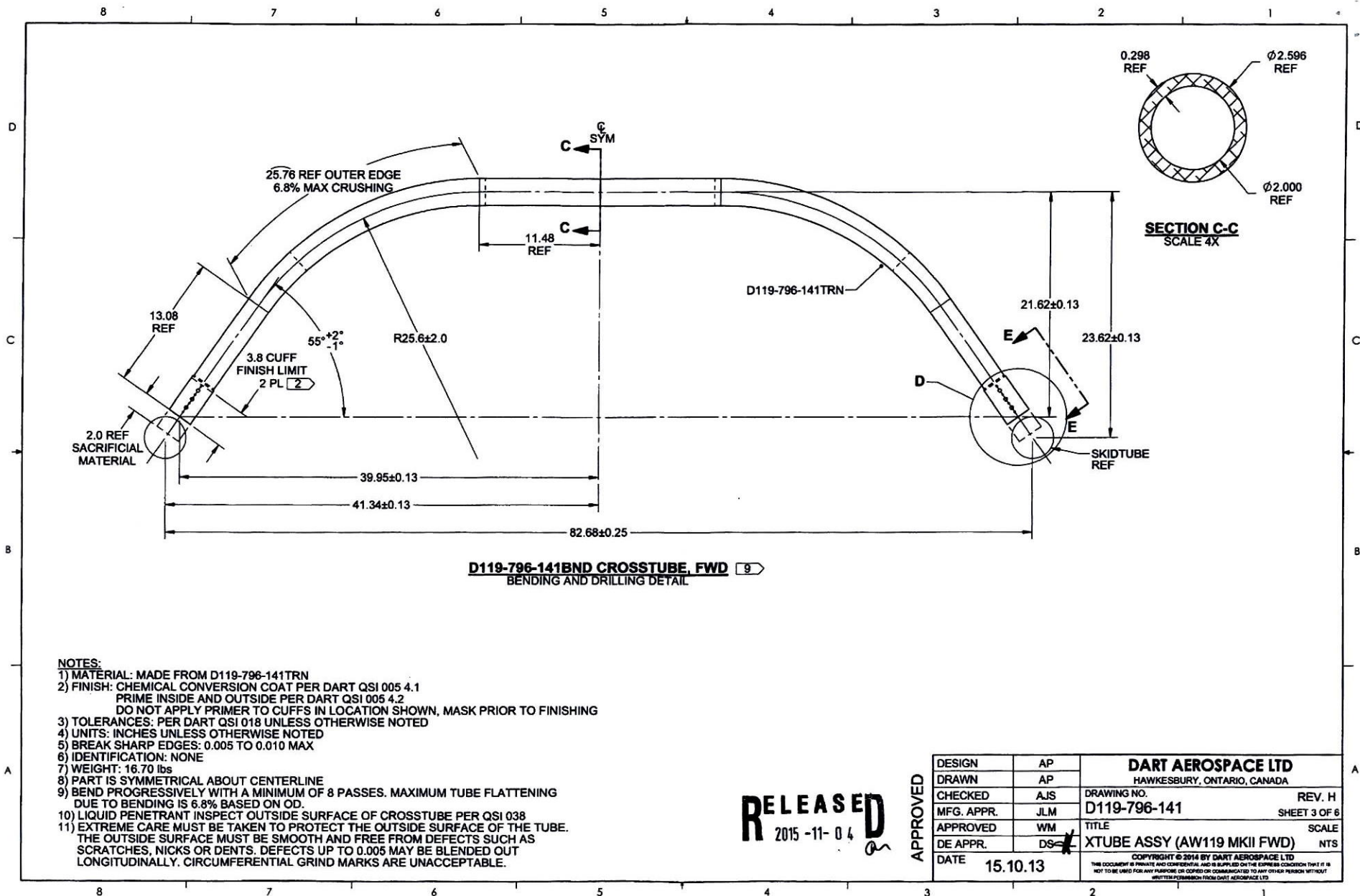


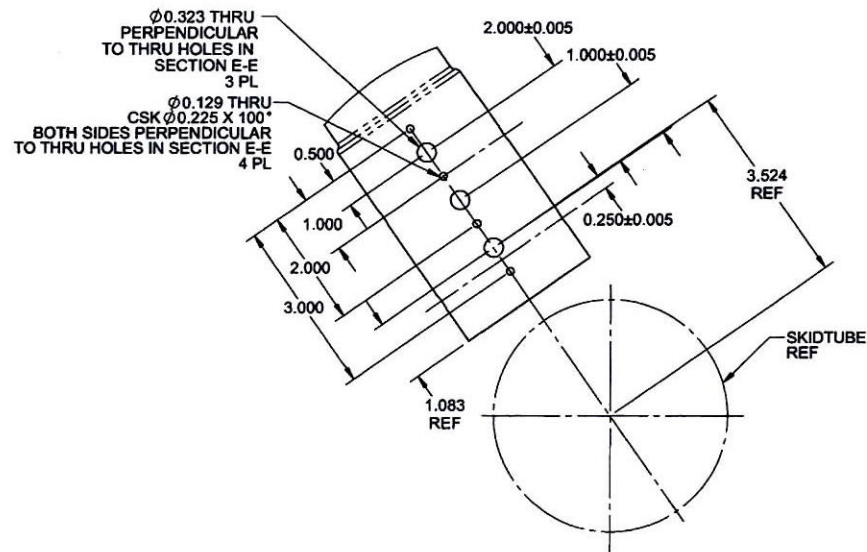
SECTION A-A
SCALE 2X

RELEASED
2015-11-04

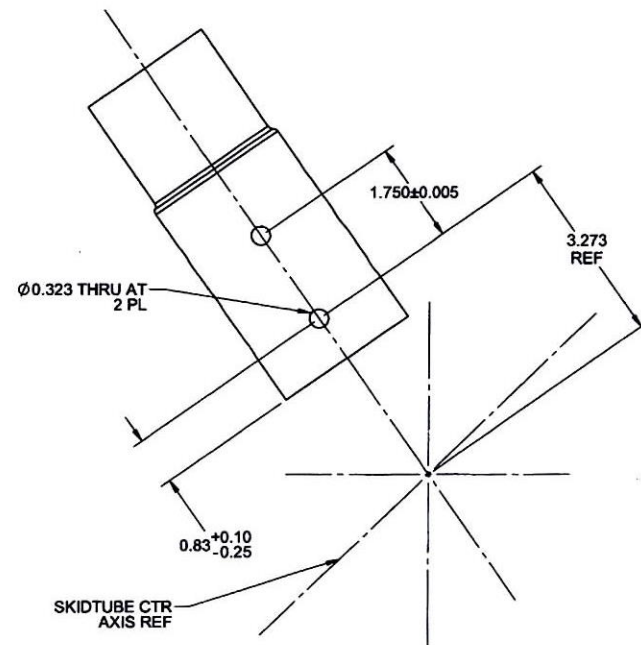
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DRAWN	AP		
CHECKED	AJS	DRAWING NO.	REV. H
MFG. APPR.	JLM	D119-796-141	SHEET 2 OF 6
APPROVED	WM	TITLE	SCALE
DE APPR.	DS	XTUBE ASSY (AW119 MKII FWD)	NTS
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VIEW D
SCALE 4X

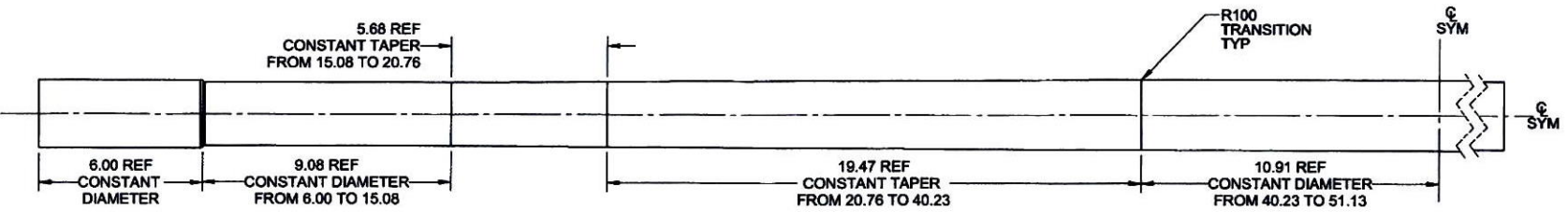
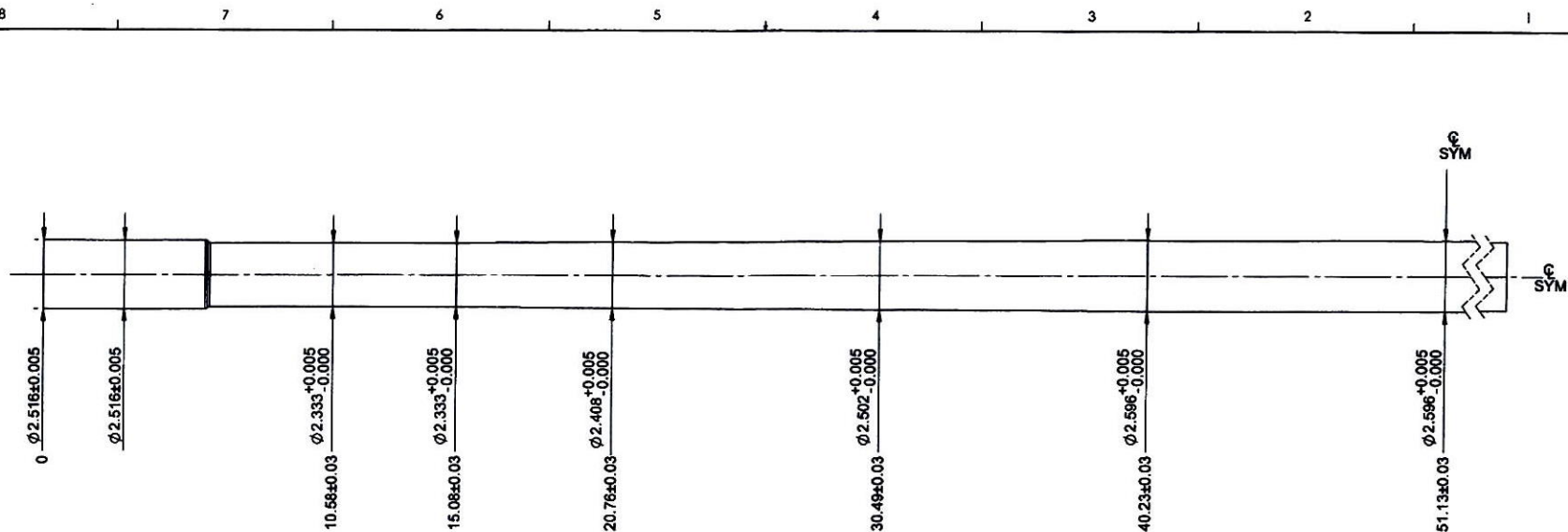


VIEW E-E
SCALE 2X

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MFG. APPR.	JLM	D119-796-141	SHEET 4 OF 6
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D119-796-141TRN CROSSTUBE, FWD

NOTES:

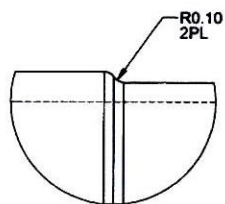
- 1) MATERIAL: MANUFACTURE FROM D6024-103 (PREFERRED) OR D6005-103
FINISHED LENGTH = 102.26 ± 0.020 (BEFORE BENDING/TRIMMING)
- 2) FINISH: NONE
- 3) TOLERANCES: PER DART QSI 018 UNLESS OTHERWISE NOTED
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX
- 6) IDENTIFICATION: NONE
- 7) WEIGHT: 16.70 lbs
- 8) PART IS SYMMETRICAL ABOUT CENTERLINE

RELEASED
2015-11-04

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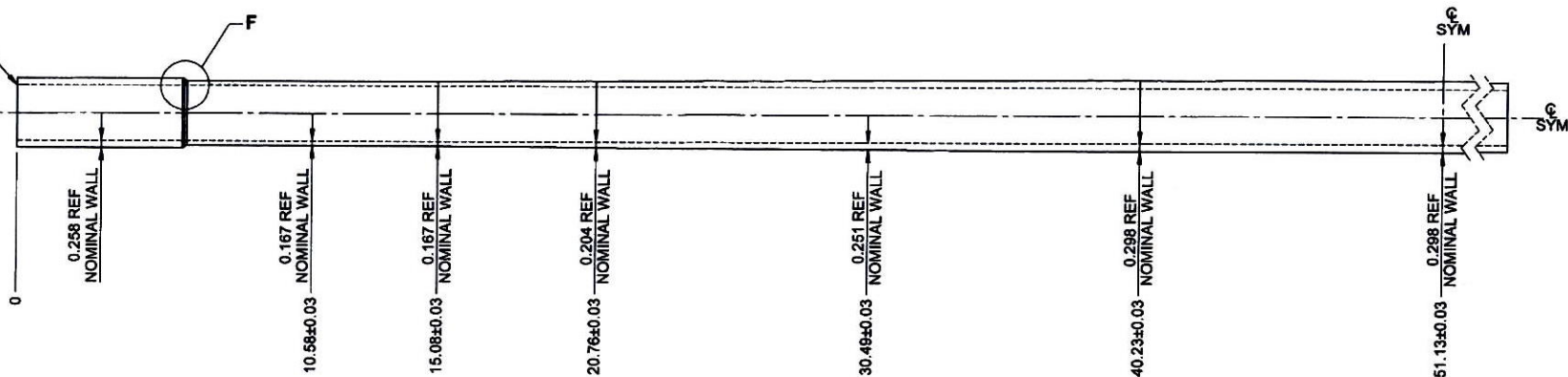
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DRAWN	AP	HAWKESBURY, ONTARIO, CANADA	
CHECKED	AJS	DRAWING NO.	REV. H
MFG. APPR.	JLM	D119-796-141	SHEET 5 OF 6
APPROVED	WM	TITLE	SCALE
DE APPR.	DS	XTUBE ASSY (AW119 MKII FWD)	NTS
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D119-796-141TRN CROSSTUBE, FWD
 SUPPLEMENTAL VIEW: NOMINAL WALL THICKNESS



DETAIL F
 SCALE 2X

CHAMFER ID
 AS REQUIRED
 FOR TOOLING



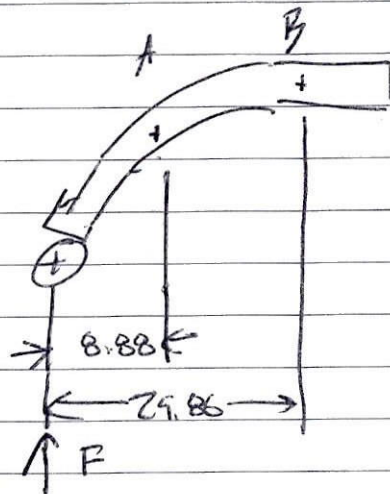
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MFG. APPR.	JLM	D119-796-141	SHEET 8 OF 8
APPROVED	WM	TITLE	SCALE
DE APPR.	DS	XTUBE ASSY (AW119 MKII FWD)	NTS
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D119-796-141 166879-A

17/12/4



$$I_A = 0.706 \text{ in}^4 \text{ (AutoCAD)}$$

$$I_B = 1.440 \text{ in}^4 \text{ (AutoCAD)}$$

$$d_A = 8.88 \text{ in}$$

$$d_B = 29.86 \text{ in}$$

$$S = M C / I = F d C / I$$

$$C_A = 2.359 / 2 = 1.179$$

$$C_B = 2.596 / 2 = 1.298$$

$$\therefore F_A \times d_A \times C_A / I_A = F_B \times d_B \times C_B / I_B$$

$$F_A = F_B \times 29.86 \times 1.298 \times 0.706 / (1.440 \times 8.88 \times 1.179)$$

$$F_A = 1.80 F_B$$

$$M.S. = 1.80 - 1 = 0.8$$

Tube will fail in bending at point B before point A becomes critical.

17/12/4